

What Is Claimed Is:

- 1 1. An apparatus that facilitates self-correcting memory in a shared-
2 memory system, comprising:
3 a main memory;
4 a memory controller coupled to the main memory;
5 a processor cache;
6 a communication channel coupled to the processor cache and to the
7 memory controller;
8 an error detection and correction mechanism within the memory
9 controller; and
10 a reading mechanism within the memory controller that is configured to
11 read a data from the processor cache when a currently valid copy of the data is
12 checked out to the processor cache;
13 wherein the error detection and correction mechanism corrects errors in
14 the data and stores a corrected copy of the data in the main memory.
- 1 2. The apparatus of claim 1, wherein the error detection and
2 correction mechanism performs single bit error correction/double bit error
3 detection.
- 1 3. The apparatus of claim 1, wherein the error detection and
2 correction mechanism performs double bit error correction.
- 1 4. The apparatus of claim 1, further comprising:
2 an input/output cache; and

3 wherein the reading mechanism is further configured to read the data from
4 the input/output cache when the currently valid copy of the data is checked out to
5 the input/output cache;

6 wherein the error detection and correction mechanism corrects errors in
7 the data and stores the corrected copy of the data in the main memory.

1 5. The apparatus of claim 4, further comprising:

2 a second processor cache;

3 wherein the reading mechanism is further configured to read the data from
4 the second processor cache when the currently valid copy of the data is checked
5 out to the second processor cache; and

6 wherein the error detection and correction mechanism corrects errors in
7 the data and stores the corrected copy of the data in the main memory.

1 6. The apparatus of claim 5, further comprising a marking mechanism

2 within the memory controller that is configured to mark a location in the main

3 memory to indicate that the data from the location is checked-out to a cache,

4 wherein the cache is one of, the processor cache, the input/output cache, and the

5 second processor cache.

1 7. The apparatus of claim 6, further comprising a scrubbing

2 mechanism within the memory controller that is configured to access each

3 location within the main memory periodically to allow the error detection and

4 correction mechanism to detect and correct errors.

1 8. The apparatus of claim 7, further comprising:

2 a detecting mechanism coupled to the scrubbing mechanism that is
3 configured to detect the location in the main memory when the location is marked
4 that the data from the location is checked-out to the cache; and
5 the reading mechanism that is further configured to request a read from the
6 communication channel if the location is so marked.

1 9. The apparatus of claim 8, wherein the communication channel is a
2 coherent network.

1 10. A multiprocessor shared-memory computing system that facilitates
2 self-correcting memory, comprising:
3 a main memory;
4 a memory controller coupled to the main memory;
5 a processor cache;
6 a central processing unit coupled to the processor cache;
7 a communication channel coupled to the processor cache and to the
8 memory controller;
9 an error detection and correction mechanism within the memory
10 controller; and
11 a reading mechanism within the memory controller that is configured to
12 read a data from the processor cache when a currently valid copy of the data is
13 checked out to the processor cache;
14 wherein the error detection and correction mechanism corrects errors in
15 the data and stores a corrected copy of the data in the main memory.

1 11. The multiprocessor shared-memory computing system of claim 10,
2 wherein the error detection and correction mechanism performs single bit error
3 correction/double bit error detection.

1 12. The multiprocessor shared-memory computing system of claim 10,
2 wherein the error detection and correction mechanism performs double bit error
3 correction.

1 13. The multiprocessor shared-memory computing system of claim 10,
2 further comprising:
3 an input/output cache;
4 an input/output device coupled to the input/output cache; and
5 the reading mechanism further configured to read the data from the
6 input/output cache when the currently valid copy of the data is checked out to the
7 input/output cache;
8 wherein the error detection and correction mechanism corrects errors in
9 the data and stores the corrected copy of the data in the main memory.

1 14. The multiprocessor shared-memory computing system of claim 13,
2 further comprising:
3 a second processor cache;
4 a second central processing unit coupled to the second processor cache;
5 and
6 the reading mechanism that is further configured to read the data from the
7 second processor cache when the currently valid copy of the data is checked out to
8 the second processor cache;

1 wherein the error detection and correction mechanism corrects errors in
2 the data and stores the corrected copy of the data in the main memory..

1 15. The multiprocessor shared-memory computing system of claim 14,
2 further comprising a marking mechanism within the memory controller that is
3 configured to mark a location in the main memory to indicate that the data from
4 the location is checked-out to a cache, wherein the cache is one of, the processor
5 cache, the input/output cache, and the second processor cache.

1 16. The multiprocessor shared-memory computing system of claim 15,
2 further comprising a scrubbing mechanism within the memory controller that is
3 configured to access each location within the main memory periodically to allow
4 the error detection and correction mechanism to detect and correct errors.

1 17. The multiprocessor shared-memory computing system of claim 16,
2 further comprising:
3 a detecting mechanism coupled to the scrubbing mechanism that is
4 configured to detect the location in the main memory when the location is marked
5 that the data from the location is checked-out to the cache; and
6 the reading mechanism that is further configured to request a read from the
7 communication channel if the location is so marked.

1 18. The multiprocessor shared-memory computing system of claim 17,
2 wherein the communication channel is a coherent network.

1 19. A method for facilitating self-correcting memory in a shared
2 memory system, comprising:

3 marking as invalid a memory location within a plurality of memory
4 locations when a data from the memory location is checked out to a cache;
5 scrubbing the plurality of memory locations for errors; and
6 upon detecting the memory location marked as invalid;
7 reading the data from the cache associated with the memory
8 location,
9 correcting an error in the data, and
10 writing the data to the memory location.

1 20. The method of claim 19, wherein scrubbing the plurality of
2 memory locations for errors includes:
3 accessing the memory location;
4 locating a valid copy of the data associated with the memory location;
5 reading the valid copy of the data;
6 correcting an error in the data;
7 writing the data to the memory location; and
8 repeating the steps of accessing, locating, reading, correcting, and writing
9 for each memory location within the plurality of memory locations.